ABSTRACT OF THE DISCLOSURE

An imaging system and method combines a magnetic resonance imaging (MRI) system and an x-ray fluoroscopy system such that the two systems have coincident fields of view. X-rays are generated by a stationary anode x-ray tube in which an electron beam is accelerated from a cathode to an anode. In the presence of the static magnetic field of the MRI system, the electron beam is deflected unless it is parallel to the static magnetic field. The x-ray source of the invention contains elements used to steer the electron beam and increase its focusing on the anode. The beam can be steered electrostatically, electromagnetically, or by adding magnetic material to the x-ray source. In the resulting system, MR and x-ray images are acquired without moving the object, which is particularly useful for image-guided medical intervention procedures.